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ABSTRACT

A workshop report provides the structure and content of a school building vulnerability reduction plan for schools in Dominica, determines roles and interactions between school stakeholders, and designs a natural hazard vulnerability reduction program. It provides a profile of the current stock of school buildings in Dominica while also addressing the issues of design, construction, reconstruction after destruction, retrofitting, rehabilitation, and other school building concerns. It also outlines the process involved in school construction to identify responsibilities at various levels of the process and examines issues of design and construction criteria, site selection, financing, and level of community involvement. Issues are highlighted pertaining to levels of preparedness at the national level and the participation of key stakeholders in disaster management activities. Existing plans and strategies and the roles of teachers and students in disaster management are also addressed. The plan concludes with recommendations. An appendix includes an overview of government schools in Dominica. (GR)

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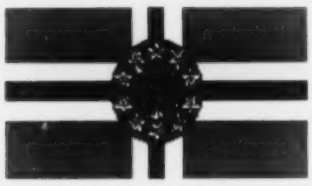
ED 432 901

Plan to Reduce the Vulnerability of School Buildings to Natural Disasters Dominica



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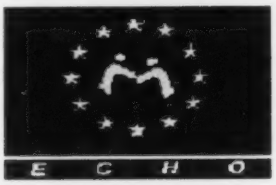

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1.0 INTRODUCTION

On January 27th 1998 the Organisation of American States (OAS) in collaboration with the European Community Humanitarian Office (ECHO) and the Government of Dominica sponsored a workshop as part of a process to produce a plan to reduce the vulnerability of school buildings to natural disasters.

The workshop was held at the Public Service Training Centre in Roseau in the Commonwealth of Dominica, and had the following objectives:

- To introduce the structure and content of a school building vulnerability reduction plan.
- To develop a process for vulnerability reduction in the education sector which includes input from Government ministries, religious groups, volunteers, the community, national and regional organisations, and international donor and funding agencies.

- To provide a format for interaction between all individuals and organisations involved in school infrastructure design, construction, retrofitting, maintenance and financing.
- To design a natural hazard vulnerability reduction program for the education sector which takes into consideration, policies, processes, projects and preparedness issues.

The workshop was attended by a wide range of public and private sector interests. This plan is an outcome of that workshop and will serve as a guide in the implementation of the project aimed at reducing the vulnerability of schools to natural disasters.

The plan will seek to do the following:

- Serve as part of a database on the school building sector in Dominica.
- Guide the design, location, construction, rehabilitation and maintenance of school buildings.
- Inform policies and processes as relevant to the school building construction sector and the wider construction sector in general.
- Serve as the key instrument in the implementation of the school retrofitting project.
- Inform decisions relevant to the use of school buildings as emergency shelters.

The plan provides a profile of the current stock of school buildings in the Commonwealth of Dominica and elaborates on the responsibility of respective local agencies in the life cycle of school buildings. It addresses the issues of design, construction, reconstruction after destruction, retrofitting, rehabilitation, repair after damage, maintenance and the process of building a profile and database for the school building sector.

Prevalent natural hazards such as hurricanes, earthquakes, volcanic eruptions, floods and landslides are also examined. It must be noted that Dominica is most vulnerable to hurricanes.

The plan provides information on the vulnerability of school buildings; the methodology used in the assessment of school buildings; and profiles school buildings which includes - maps showing physical location, information on the date of construction, design type, current uses of the buildings and the agencies responsible for construction and maintenance of school buildings in Dominica.

The plan examines existing policies pertaining to school buildings in the island relative to acceptable levels of vulnerability, building codes, existing norms, performance standards, priorities, current trends and enforcement of those policies.

An outline of the process involved in the construction of school buildings is given with a view to identify responsibilities at various levels of the process. The plan also attempts to provide justification for the project which is aimed at reducing the vulnerability of school buildings to natural disasters. It examines the issues of design and construction criteria, site selection, financing and the level of community involvement during construction activities.

It highlights the issues pertaining to levels of preparedness at the national level and the participation of key stakeholders in disaster management activities. It looks at existing plans and strategies, the role of teachers and students in disaster management at the school level and the development of the school curriculum visavis disaster preparedness activities.

The plan ends with conclusions and recommendations at section nine (9).

2.0 THE SCHOOL CONSTRUCTION SECTOR

2.1 Profile of the Buildings

Four broad categories can be used to describe the nature of school buildings in Dominica:

- Reinforced concrete frame with concrete roof and floors - one and two storey.
- Reinforced concrete frame with timber framed roof - one and two storey.
- Steel frame buildings with metal clad roofs - one and two storey.
- Light steel frame buildings - one storey.

2.2 Responsible Agencies and Collaborators

a. **Design**

Ministry of Education, Ministry of Communications, Works and Housing, Architectural and Engineering Consultants, the Community, Parent/Teacher Associations, Teachers, Students, Ministry of Finance, Financial Agencies, Planning Division, Fire Services, Public Health Department, Disaster Preparedness and Management Personnel.

b. Construction

Contractors, Ministry of Communications, Works and Housing, Consultants, Ministry of Education, Planning Division, Insurance Agencies, Financial Institutions, Ministry of Finance and the Community.

c. Reconstruction after Destruction

Ministry of Education, Ministry of Communications, Works and Housing, Consultants, Financial Agencies, Contractors and the Ministry of Finance.

d. Retrofit

Ministry of Education, Ministry of Communications, Works and Housing, Consultants, Financial Agencies, Contractors and the Ministry of Finance.

e. Rehabilitation

Ministry of Education, Ministry of Communications, Works and Housing, Consultants, Financial Agencies, Contractors and the Ministry of Finance.

f. Repair after Damage

Ministry of Education, Ministry of Communications, Works and Housing, Consultants, Financial Agencies, Contractors and the Ministry of Finance.

g. Maintenance

Teaching and other staff, Students, Ministry of Education, Parent/Teacher Associations, Ministry of Communications, Works and Housing, Ministry of Finance, Funding Agencies,

Consultants, Contractors and the Community.

2.3 Building a Profile and Database

- Starts with description of building - structure, finishes, and services, detail nature and type of materials used, expected life, proposed maintenance schedule with budget.
- As-built design for each school.
- Preferably initiated by designers and followed up on by maintenance unit of Ministry of Education. Current database does not include all information suggested above, however, it contains additional useful information. (see annex 10.1)

3.0 PREVALENT NATURAL HAZARDS (see annex 10.3 and 10.4)

3.1 Hurricanes

Weather conditions with high winds, heavy and intensive rainfall, with associated flooding and landslides, high seas and associated flooding and erosion. These hurricanes generally occur between June and November every year.

3.2 Earthquakes

Ground tremors of variable intensity which can cause subsistence, heave, liquefaction of soil, landslides etc. In Dominica, our history does not indicate significant frequency of very intense tremors, though there are a large number of small tremors of short duration, most are not noticeable to most people. However, we are in a seismically active area and therefore must take necessary precautions as these events are not season dependent and can take place at any time.

3.3 Volcanic Eruptions

Because of our geography, we are blessed (or cursed) with ten (10) or twelve (12) volcanoes. Although this indicates that we have the largest number of volcanoes in the Eastern Caribbean, even in the whole Caribbean, their level of activities is relatively insignificant based on information available at this time. Therefore, the threat is apparently very low. Caribbean volcanoes are generally of the most dangerous kind, i.e. the explosive type which spews hot ash which can cover wide areas in a very short time.

3.4 Floods

Flooding may arise from high seas, overflowing rivers from heavy rainfall, or breaking dams such as at the Layou River. Low-lying areas within valleys and along coastlines are especially vulnerable to flooding.

3.5 Landslides

Slippage of land to lower elevations arising out of loss of soil strength because of a combination of moisture conditions, soil type, topography and loading conditions.

3.6 Maps

A national landslide hazard map has been prepared, although its scale may prevent its widespread use. It may be necessary to further develop the map.

4.0 DETERMINING THE VULNERABILITY OF SCHOOL BUILDINGS

4.1 Methodology

- Assess risks or hazards that are present or likely to occur.
- Collection of basic structural and physical information of all structures including details of location.
- Analysis of data with regard to the ability to resist the effect of specific natural and man made hazards.
- Demarcation of special areas within school buildings for use as a shelter, this could also have implications for the level of natural hazard vulnerability, retrofitting, etc.
- Determination of entity responsible for construction and maintenance as well as the preparation of relevant plans by these entities.

In order to achieve the above, a survey can be carried out using survey forms suggested by this program (a form that is more detailed than the form currently being used) to evaluate the vulnerability of buildings presently designated as emergency shelters. The suggested survey forms deal with hurricane and seismic vulnerability. These forms deal with the structural integrity of the buildings themselves and the general safety of the users, but do not take into consideration the comfort of inhabitants during hazardous events. In addition, the forms do not provide for status or condition of building elements. The forms are useful for general assessment of school buildings but do not necessarily consider the suitability of schools as emergency shelters. (see annex 10.2)

4.2 Current Situation in Schools/Shelters

An emergency shelter can be described as a place of refuge and safety during and after times of emergencies. These emergencies include hurricanes, earthquakes, landslides, floods, volcanoes, etc. These could be short-lived but could be also for an extended period.

In order to satisfy the requirements of an emergency shelter, the shelter, must have certain characteristics and possess the necessary facilities in order that lives can be safeguarded and sustained for the appropriate period of time. Evidently, the most important characteristic is the ability to adequately resist the effects of the hazard, either by means of location and/or adequate structural strength and integrity. This could be achieved by proper site selection depending on the nature of the prevalent hazards, appropriate design, and timely maintenance of the buildings concerned.

Other important characteristics that shelters should possess are reasonably comfortable accommodation, sanitary facilities, feeding facilities, medical facilities and communication equipment. In the case of schools/shelters, the provision of most of these facilities would normally be the responsibility of agencies other than the providers of the school buildings themselves, such as the Ministry of Education. The extent to which these other facilities are provided depends largely on the policies and ability of the concerned agencies.

Given the nature of our hazard-prone environment, there will always be the need for emergency shelters in

our communities. Because of their availability in most communities, as well as their ability to accommodate a relatively large number of people, at least for short periods, school buildings have been traditionally used as shelters.

In Dominica, there are currently fifty nine (59) Government primary schools and eight (8) denominational schools. Of these, approximately twenty nine (29) schools have been built prior to 1979. The overwhelming majority of the school buildings built before 1979 were designed and built to standards less than what is currently thought necessary, especially in regard to resistance to wind forces. This is understandable given the level of awareness and disaster management existing at the time.

However, the passage of Hurricane David in August 1979 and subsequent widespread destruction of buildings destroyed myths and brought about a much higher level of awareness for the need to have properly designed school buildings as well as the need to have adequately secure emergency shelters in times of disaster. The passage of Hurricane Allen in 1980 further heightened that awareness and the school reconstruction process, in particular, took very special note of the experiences and the lessons learnt from them.

As a result the schools which were built from 1980 onward generally followed the trend of having, among other things, concrete roofs which were well suited to resisting the effects of high winds. This was done with the primary view of ensuring functionality in the long term as well as providing reasonably safe shelters for the communities concerned.

Nevertheless, there is a large number of older building stock, some of which were damaged during the hurricanes Luis and Marilyn in 1995. The rehabilitation of these damaged school buildings did not follow the same process after 1979which had coincided with an educational facilities expansion program. Because of various factors, the post 1995 rehabilitation generally consisted of putting the school buildings back as they were prior to the hurricanes. These major design shortcomings were not addressed and these buildings remain as vulnerable as ever to high winds among other hazards.

It is hoped that this project together with others will assist in identifying these shortcomings and suggest various means for overcoming these shortcomings through retrofitting measures that are both technically feasible as well as cost-effective.

4.3 School Vulnerability Matrix

Name Of School/Community	*Hurricane*	*Earthquake*	*Volcano*	*Flood*	*Landslide*
Marigot Foundation High School/ Marigot Junior School/Primary School/Pre-School	***	***			
Woodford Hill Government School Woodford Hill	***	***			
Petite Soufriere Government School Petite Soufriere	***	***			
San Sauveur Government School San Sauveur	***	***		***	

Mahaut River Government School Carib Territory	***	***			***
Atkinson Government School Atkinson	***	***			
Vieille Case Government School Vieille Case	***	***			
Thibaud central Government School Thibaud	***	***			***
Bense/Anse-de-mai/Anse Soldat Government School, Bense	***	***			
Paix Bouche Government School Paix Bouche	***	***			***
Dos D'Ane Government School	***	***			***
St. Johns Primary School, Portsmouth	***	***		***	
Portsmouth Government School Portsmouth	***	***		***	
Savanne Paille Government School Savanne Paille	***	***		***	
Tete Morne Government School	***	***	***		
Morne Jaune Government School Morne Jaune	***	***			***
Pichelin Government School, Pichelin	***	***		***	***
Bagatelle Government School Bagatelle	***	***			
Petite Savanne Government School	***	***			***

Petite Savanne					
Bellevue Chopin Government School Bellevue Chopin	***	***			
Delices Government School, Delices	***	***			
La Plaine Government School La Plaine	***	***			
Boetica Government School, Boetica	***	***			
Dublanc Government School, Dublanc	***	***			
Colihaut Government School, Colihaut	***	***		***	
Nehemiah Comprehensive School Jimmit	***	***			
Mahaut Government School, Mahaut	***	***			
Salisbury Government School Salisbury	***	***			
St Joseph Government School St Joseph	***	***			
Belles Government School, Belles	***	***			
Coulibistrie Government School Coulibistrie	***	***		***	***
Massacre Government School Massacre	***	***		***	
Warner Government School, Warner	***	***			
Campbell Government School	***	***			***
Soufriere Government School Soufriere	***	***	***	***	

Scotts Head Government School Scotts Head	***	***	***		
Giraudel Government School, Giraudel	***	***	***		***
Eggleston Government School Eggleston	***	***	***		
Morne Prosper Government School Morne Prosper	***	***	***		
Wotten Waven Government School Wotten Waven	***	***	***		
Newtown Government School Newtown	***	***			
Trafalgar Government School Trafalgar	***	***	***		
Laudat Government School, Laudat	***	***	***		
St. Mary's Primary, Roseau	***	***	***		
Goodwill Government School Goodwill	***	***	***		
Clifton Dupigny Community College Simon Boliva Housing Scheme Stock Farm	***	***			
Teachers College Bath Estate/ Elmshall	***	***	***		***
Cockrane Government School Cockrane	***	***			

The School Vulnerability Matrix above consists of all schools/educational institutions currently being used as emergency shelters. The analysis indicates that most school buildings are vulnerable to hurricane force wind and heavy rains. This includes school buildings with concrete roofs. Most of the school buildings built under the Basic Needs Trust Fund (BNTF) have concrete roofs, however, there is heavy water ingress

through design blocks fashioned for proper ventilation.

It should also be noted that Dominica is seismically vulnerable. For more information on seismic vulnerability, please consult the article, *On Reducing the Earthquake Hazards of Puerto Rico and the Virgin Islands* by William McCann published in the Bulletin of the Seismological Society of America, Vol.75, No.1(February 1985), pages 251 - 262.

The balance of the data is self explanatory.

4.4 Landslide Hazard Map Showing the Location of School Buildings

(not available on the web)

4.5 List of Schools Used as Shelters

No.	Community	School/Educational Institution	Responsible Organisation/Owner
1.	Marigot	Foundation High School Junior School Primary School Pre - School	Government of Dominica and the Community
2.	Woodford Hill	Primary School	Government of Dominica
3.	Petite Soufriere	Primary School	Government of Dominica
4.	San Sauveur	Primary School	Government of Dominica
5.	Carib Territory	Primary School	Government of Dominica
6.	Atkinson	Primary School	Government of Dominica
7.	Vieille Case	Primary School	Government of Dominica
8.	Thibaud Central	Primary School	Government of Dominica
9.	Bense/Anse-de-ai/Anse Soldat	Primary School	Government of Dominica
10.	Paix Bouche	Primary School	Government of Dominica
11.	Dos D'Ane	Primary School	Government of Dominica
12.	Portsmouth	St. John's School	Catholic Church
13.	Portsmouth	Primary School	Government of Dominica
14.	Savanne Paille	Primary School	Government of Dominica

15.	Tete Morne	Primary School	Government of Dominica
16.	Pichelin	Primary School	Government of Dominica
17.	Bagatelle	Primary School	Government of Dominica
18.	Petite Savanne	Primary School	Government of Dominica
19.	Bellevue Chopin	Primary School	Government of Dominica
20.	Delices	Primary School	Government of Dominica
21.	La Plaine	Primary School	Government of Dominica
22.	Morne Jaune	Primary School	Government of Dominica
23.	Boetica	Primary School	Government of Dominica
24.	Dublanc	Primary School	Government of Dominica
25.	Colihaut	Primary School	Government of Dominica
26.	Jimmit	Nehemiah Comprehensive School	Board of Management
27.	Mahaut	Primary School	Government of Dominica
28.	Salisbury	Primary School	Government of Dominica
29.	St Joseph	Junior School	Government of Dominica
30.	Belles	Primary School	Government of Dominica
31.	Coulibistrie	Primary School	Government of Dominica
32.	Massacre	Primary School	Government of Dominica
33.	Warner	Primary School	Government of Dominica
34.	Campbell	Primary School	Government of Dominica

35.	Soufriere	Primary School	Government of Dominica
36.	Scotts Head	Primary School	Government of Dominica
37.	Giraudel	Primary School	Government of Dominica
38.	Eggleston	Primary School	Government of Dominica
39.	Morne Prosper	Primary School	Government of Dominica
40.	Wotten Waven	Primary School	Government of Dominica
41.	Newtown	Primary School	Government of Dominica
42.	Trafalgar	Primary School	Government of Dominica
43.	Laudat	Primary School	Government of Dominica
44.	Roseau	St. Mary's Primary	Catholic Church
45.	Goodwill	Primary School	Government of Dominica
46.	Simon Boliva Housing Scheme Stock Farm	Clifton Dupigny Community College	Government of Dominica
47.	Bath Estate/ Elmshall	Teachers College	Government of Dominica
48.	Cockrane	Primary School	Government of Dominica

5.0 POLICY FRAMEWORK

5.1 International/Regional

Numerous resolutions have been passed and decisions made highlighting the need to address the issue of vulnerability reduction and disaster mitigation. Cited below is a selection of relevant mandates pertaining to the reduction of vulnerability of school buildings to natural disasters. These international and regional mandates provide the framework for national policy issues.

Permanent Council of the OAS, CP/RES 546 (834/90). October 10 1990.

> Resolution 3: To encourage member states to make natural hazard management and disaster relief integral components of their socioeconomic development activities.

International Decade for Natural Disaster Reduction 1990-2000 (IDNDR) which was proclaimed by the General Assembly of the United Nations by Resolution 44-236.

Permanent Council of the OAS CP/RES 593 (922/92) October 28, 1992.

Resolution 4: To encourage member states to undertake natural hazard vulnerability reduction programs as an integral part of their efforts to alleviate conditions of poverty and achieve sustainable economic growth.

Declaration of Cartagena, Interamerican Conference on Natural Disaster Reduction March 21-24, 1994.

Recommendation 2: In the understanding that such vulnerability is one of the shortcomings of underdevelopment and environmentally harmful actions, it is essential to co-operate the willingness to recognise that such vulnerability should be among the explicit objectives of sustainable development planning and an indicator of environmental impact accountability. The development of monitoring techniques and the tallying of disaster vulnerability factors must be seen as essential tools for disaster prevention and mitigation.

Recommendation 3: There is a need for eliciting greater community participation to gain greater in-depth understanding of individual and collective perceptions on such developments and their attendant risks and to assess the cultural and organisational features of the societies aside from their behaviour and relationship with their physical and natural environment, which may hamper or enhance prevention and mitigation as well as those that encourage or hinder the protection of the environment for the development of future generations; these being fundamental aspects in the definition of effective and efficient resources to mitigate the impact of the disasters on the region.

Recommendations 5: Given the importance and validity of cultural aspects during disasters, there should be the strengthening and encouragement of educational programs for the population and training programs for researchers, planners experts and officials so as to provide them with adequate, diversified knowledge of the realities in order to incorporate preventive aspects not in the culture.

CIECC (Inter-American Council for Education, Science and Culture), OAS/RES 1995

Declaration of Santa Cruz de la Sierra and Plan of Action for the Sustainable Development of the Americas. October 1996.

Initiative 6: Promote the inclusion of disease outbreak response and disaster planning, preparedness, and mitigation in national development plans; seek to establish, as appropriate, regional emergency response building construction codes that include regulatory and enforcement mechanisms through the sharing of technical information and expertise.

Initiative 45: Foster the inclusion of sustainable development in urban development plans, including mechanisms for evaluating environmental impact.

Interamerican Program for Sustainable Development (PIDI) of the OAS. June 25, 1997.

Resolution 4.1b iii: Promote the exchange of information for supporting established networks for the exchange of experiences and methods in the forecasting and mitigation of natural disasters, so that this topic can be incorporated into national development programs.

Resolution 4.1c: Provide cooperation for:

i. Curriculum innovation and adaptation to incorporate the environment and the concept of sustainable development into regional programs of basic education and

education work.

ii. The incorporation of the topic of natural hazard mitigation in national development plans, the encouragement of the adoption of appropriate building codes, and the preparation and strengthening of regional disaster relief plans.

iv. The coordination of activities and services of projects supporting the preparation of vulnerability profiles and the preparation of sectoral investment plans to reduce vulnerability to natural disasters.

5.2 National

Following the passage of Hurricane David, Dominica experienced heavy loss to it's existing buildings – commercial/office/industrial, institutional (particularly schools), and residential units. Through assistance from the then Pan Caribbean Disasters Preparedness and Prevention Project based in Antigua, a series of workshops was held for builders in the main settlements of Dominica, namely Roseau, Grand Bay, La Plaine, Castle Bruce, Marigot, Portsmouth, Salisbury and St. Joseph.

Again in 1989 following damage by Hurricane Hugo, the Government of the Commonwealth of Dominica made a request to the Caribbean Development Bank (CDB) for technical assistance to do a series of workshops for builders - particularly small builders. The sessions were held in Dominica and Montserrat.

Sometime in 1993, the United Nations Development Programme (UNDP) and UNCHS prepared a model draft of a Physical Planning Act for member states of the Organisation of Eastern Caribbean States (OECS). Among it's many useful provisions, the draft Act makes provisions for among other things a building code. Following a decision by the Development and Planning Corporation in November 1997, the building code was put on trial for a three months period in the first instance. It was the feeling that persons could support committees to the Planning Division for amendment of sections of the code.

Prior to the corporation's decision, a submission had been made to the Ministry of Legal Affairs for the amendment of the Town and Country Planning Act No. 17 of 1975 to incorporate the building code as one of the provisions of the revised Act.

5.3 Trends in Construction

Trends in construction since the passage of Hurricanes David, Hugo and recently Marilyn indicate that there has been a strong focus on the question of mitigation to reduce the impact of wind forces on the buildings erected. There is now heavy emphasis on reinforcement of the various critical members of buildings notably, the roof structure, the external walls, and the foundation (bases and columns). There is a need to ensure that the level of monitoring of "all" construction be increased to ensure safe construction and allow buildings to last longer.

5.4 Enforcement of Policy

Based on strengthening the capacity of the Planning Division, the Commonwealth of Dominica is broken up into fifteen (15) central areas to ensure proper supervision of the entire country. The zones are as follows:

(a) 10 Pte Michel - Soufriere/Scotts Head
(b) 20 Roseau Region including the Valley area and Loubiere
(c) 30 Mahaut, Massacre and Belles

(d) 40 St. Joseph, Coulibistrie and Layou hinterland
(e) 50 Colihaut - Dublanc areas
(f) 60 Greater Portsmouth - Capuchin areas
(g) 71 Bense - Penville areas
(h) 72 Calibishie - Wesley areas
(i) 73 Marigot Region
(j) 81 Carib Territory
(k) 82 Castle Bruce - Petite Soufriere areas
(l) 83 Morne Jaune, Riviere Cyrique and Rosalie areas
(m) 91 La Plaine - Delices area
(n) 92 Petite Savanne - Greater Grand Bay area
(o) SCA 1 and SCA 2 - National Park areas

There are presently five (5) Development Control Officers, a Senior Development Control Officer and a Development Control technician supervising these areas. The current manpower is inadequate to properly deal with the administration of the Town and Country Planning Act. Enforcement notices are issued when persons are building contrary to the requirements of the Act. However, in an effort to fully achieve the effectiveness of the policies and current strategies to ensure compliance with respective legislation and building code, the following recommendations are being put forward:

a. Amend existing legislation (Town and Country Planning Act) to make provisions for building code.
b. School management should, from inception, plan for dual purposes for the school - a place of learning and shelter for disaster purposes.
c. The need for a zoning plan at the national level to prevent location of school buildings in vulnerable areas such as the flood plane, landslide hazard areas, etc. and determine the types of hazards existing schools are vulnerable to and take mitigation measures.
d. Training for all builders on a continuous basis (familiarise them with mitigation techniques).
e. Training for technical staff, both Education and Planning, on a regular basis on disaster mitigation techniques.
f. Increase in manpower within the Planning Division to deal with proper administration of the building code, Town and Country Planning and other relevant disaster mitigation issues.
g. Construction sites should have a supervisor or reporting agent (in order to report to the Planning Division).
h. There should be annual or bi-annual workshops addressing vulnerability reduction.
i. There should be a handbook on vulnerability reduction approaches which would serve as a guideline.
j. Assign an officer to review all capital projects submitted by Government on a fast track basis particularly those with a disaster mitigation slant. This is especially important when there is a need to shorten the approval process.
k. Institutions responsible for the management of school buildings in Dominica should liaise with the Physical Planning Division from inception (feasibility/planning stage) regarding site selection, design, etc.

6.0 PLANNING PROCESS IN THE CONSTRUCTION OF SCHOOL BUILDINGS

6.1 Design

Community Groups (extra curricula use)

Education Officials (learning centres)
Disaster Preparedness (shelter)
Fire and Ambulance (safety)
Sponsors (budget limits)
Physical Planning Site (guidelines and infrastructure)
Architectural and Engineering Consultants (design and review)

6.2 Construction

Sponsors (monitor progress against disbursement)
Contractor (construction)
Education Officials (client's interest)
Planning (monitor adherence to condition)
Consultants (monitor drawing as built)

6.3 Reconstruction

Sponsors (monitor progress against disbursement)
Contractor (construction)
Education Officials (client's interest)
Planning (monitor adherence to condition)
Consultants (monitor drawing as built)

6.4 Retrofitting

Plant Manager (hands on information/getting him to know)
Village Council (information sharing)
Contractor (information sharing)
Planning (information sharing)
Consultants (information sharing)

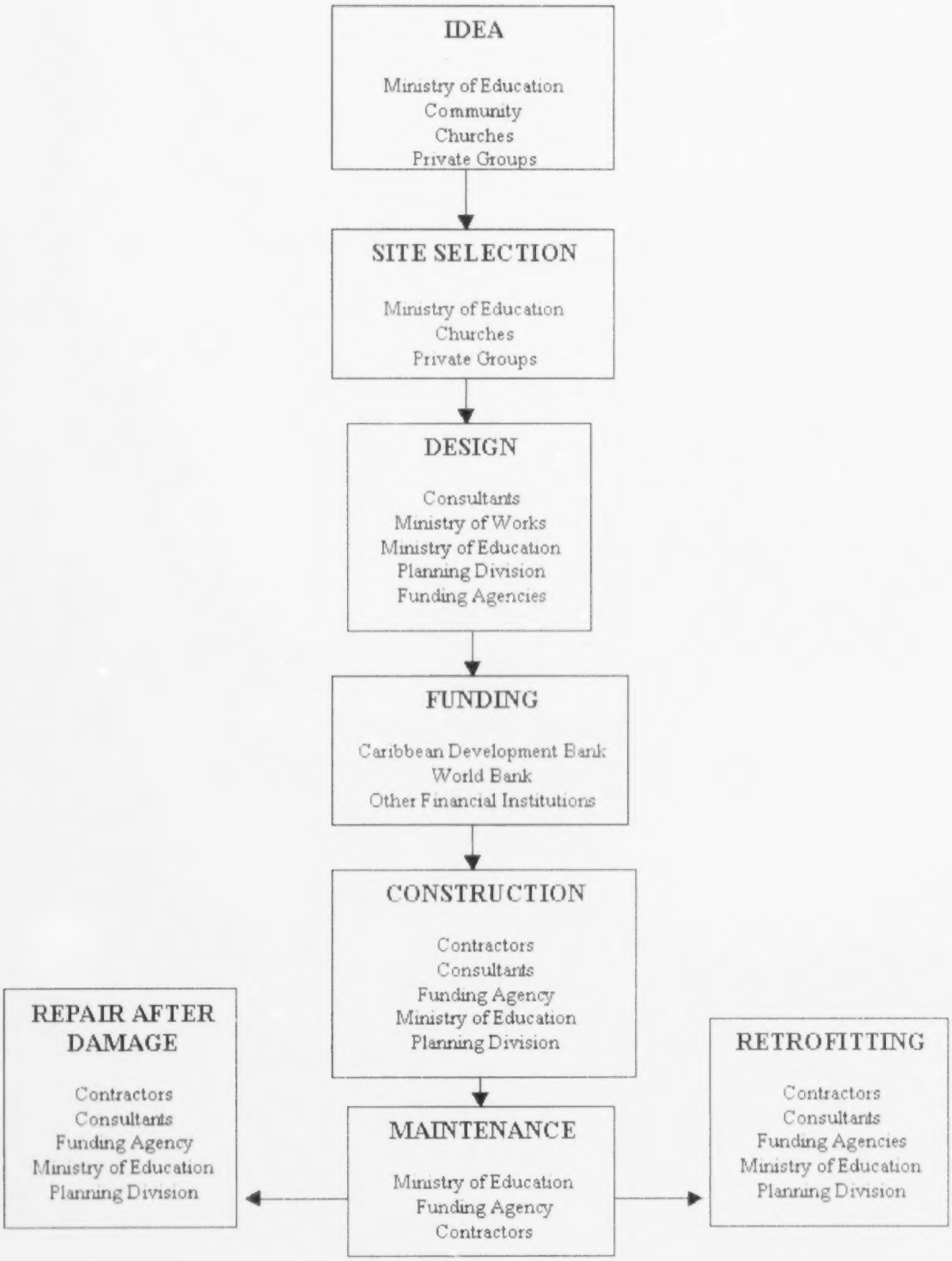
6.5 Maintenance

Plant User
Shelter Manager
Education Officials (maintenance plan)

6.6 Capacity Building

Public Awareness
General Public/Specific Counting
Media – TV, radio, newspaper
Churches, community discussions/meetings
Interschool Competition/ Theatre
Training for Principals/Teachers on preventive maintenance - Organised by Min. of Ed.
Orientation of Students - Organised by school principals
Sensitizing Parent/Teacher Organisations - Organised by the schools

6.7 Flow Chart Showing Responsible Agencies and Collaborators in the Construction and Maintenance of School Buildings



6.8 Diagram of the School Building Construction Process

(not available on the web)

7.0 PROJECTS

7.1 Reduction of Vulnerability, Why Do It?

- Safeguard investment
- To increase lifetime of building
- Useful life of building

7.2 Maintenance

- Effective maintenance is more beneficial than replacement
- This is done through design and construction criteria and adherence to building codes

7.3 Considerations for Site Selection

- Infrastructure
- Access
- Provisions for recreational facilities
- Potential for physical expansion
- Safety – man made and natural cost of construction

7.4 Financing

- Funding for school building construction is mainly derived from outside sources - funding is accepted mainly on favourable terms

7.5 Community Involvement

- Involve in site selection financing, design, maintenance, and management of the completed plant

Note

Community involvement in the planning, implementation and monitoring process is crucial to allow for community ownership of the project. Ownership of the project facilitates community care and protection once the project is completed and is in full use. School buildings in Dominica are used for learning (child/adult), recreational facilities, fund raising events, meeting places, religious purposes, and as emergency shelters especially during the passage of tropical weather systems.

7.6 Description of the School Retrofit Schedule

The proposed school retrofit programme put forward a three (3) year implementation schedule.

In year one (1) it is proposed that twenty (20) schools will be retrofitted. The schools for year one were selected on the basis of current condition, level of vulnerability and the availability of alternative shelters at

the community level. Retrofitting activities during year one will be most extensive.

The schedule is so organised that there is a reduction in work intensity into year two. The second year is mainly comprised of school buildings that were constructed under the Basic Needs Trust Fund (BNTF) programme funded by the US Agency for International Development, CDB and Government of Dominica. Eighteen (18) schools are targeted. While these buildings are relatively new and safe in terms of their ability to withstand hurricane force wind, there is considerable water ingress through ventilated blocks. There are also complaints that the designed blocks, doors and windows need reinforcement. The retrofit work on these buildings will me minimal.

The third year consists of school buildings with a safe section which can safely be used by members of the public. The intention is to examine the possibility of extending the usable space. Sixteen (16) schools are targeted. It has been recognised that in many cases the rooms that are safe for use as shelters are either the laboratory, library or kitchen. There is usually damage to equipment, books, records and the valuable furniture.

The project will look at the possibility of retrofitting less sensitive sections of the school building for use as emergency shelters.

7.7 Chart with the Proposed School Retrofit Schedule

1998/99	1999/2000	2000/2001
Atkinson Primary	Penville Primary	Portsmouth Primary
Bagatelle Primary	Savanne Paille Primary	Nehemiah Comprehensive
Bense Primary	Clifton Primary	Mahaut Primary
Boetica Primary	Dublanc Primary	Salisbury Primary
Colihaut Primary	Mahaut River Primary	St Joseph Primary
Coulibistrie Primary	Dos Dane Primary	Massacre Primary
Giraudel Primary	Petite Savanne Primary	Eggleston Primary
Goodwill Primary	Bellevue Chopin Primary	Newtown Primary
La Plaine Primary	Delices Primary	Trafalgar Primary
Marigot Primary	Belles Primary	St Mary's Primary
Morne Jaune Primary	Warner Primary	Goodwill Primary
Paix Bouche Primary	Campbell Primary	Dominica Teachers College
Petitie Soufriere	Soufriere Primary	Clifton Dupigny Community
Pichelin Primary	Scotts Head Primary	College

Salybia Primary	Morne Prosper Primary	Marigot Foundation High School
San Sauveur Primary	Wotten Waven Primary	Marigot Junior School
Tete Morne Primary	Laudat Primary	Marigot Pre-School
Thibaud Primary	Cockrane Primary	
Vieille Case Primary		
Woodford Hill Primary		

8.0 PREPAREDNESS

Preparedness can be seen as an insurance policy against disasters and is undertaken because mitigation activities cannot prevent their occurrence. Preparedness is planning how to respond when an emergency occurs and is designed to help save lives and minimise damage by preparing people to respond appropriately. Preparedness involves proper planning, organising, community involvement, training and dissemination of information.

In order to prepare our school buildings for disasters, we should be prepared to find answers to the following:

1. Is the school building easily accessible during inclement weather?
2. Are buildings checked on an annual basis to determine structural integrity?
3. Are hurricane shutters available to protect doors and windows?
4. Have the potential shelter populations been identified?
5. Are all sanitary conveniences in working order and are they sufficient to deal with the anticipated shelter population? Are back-up measures in place?
6. Are cooking facilities available?
7. What of first aid kits and other response equipment?
8. Is there a designated shelter management team and have they been trained? Is there cooperation between the team and school administration?
9. Have security measures been developed for areas of the school that are off-limits like the labs, offices etc?
10. Have forms indicating the condition of equipment and buildings at the time of handing over been developed? Are these available?
11. Are the schools equipped with fire fighting equipment and are the teachers trained in the use of the equipment?

In examining the above check-list we contacted an official at the Ministry of Education who stated that presently there are no existing plans or strategies in place to deal with preparedness of schools in the event of a disaster. On the National level, the National Disaster Preparedness Organisation has a national disaster plan. On the community level, there is the local Disaster Committee. We are not certain whether there are plans in these communities or at the schools, churches, local organisations or individual/family plans.

8.1 The Role of Teachers and Students

Teachers are to ensure that:

1. A disaster preparedness plan exists and is revised annually. Contents of the plan should include: an advisory phase - what needs to be done as soon as an advisory bulletin is given, the warning phase and the evacuation procedures which should be clearly laid-out.
2. Recommendations are made to the local disaster management team and thus to Government of their needs, etc..
3. Security measures are in place for off limits areas of the school.
4. A roll call of students, teachers and other workers is done on a daily basis.
5. Regular drills are done with the students.
6. The students' roles are to maintain the facilities and to refrain from vandalism.

8.2 Links to Curriculum Development

Through public education - to start with the inclusion of disaster preparedness and management in the school's curriculum. Students should be encouraged to do projects or field assignments on various aspects of preparedness like hazard mapping of their community, how vulnerable is their school in the event of a disaster and the procedures to follow if such an event does occur. What other potential hazards can they recognise in and around their communities?

8.3 Links to Community Involvement

Information on disaster preparedness can be extended through the preparation of individual/family plans, churches, local organisations etc.. The involvement of the Parent/ Teacher Associations would also involve the community at large - an informed people will produce an informed community.

8.4 Schools and Disaster Reduction

Schools have multiple roles in disaster reduction activities carried out by local communities. When a local community organises itself to prevent disasters and prepares to better cope with an insurgent major hazard, the role of schools is recognised as a focal point for different purposes:

- Schools can be used to spread the knowledge of risks and resources present in that community.
- Schools can be used to diffuse and instil into young generations the educational element that allow the observation of behaviours for a respectful interaction between groups of the society at risk and the local environment, built and natural, urban and rural.
- Schools can be suitable interforces between disaster reduction actions and the less accessible basic founding groups of the society at risk, the family groups.

8.5 School Buildings as Resources for Disaster Preparedness and Emergency Management

b. Maintenance of Existing Building

The maintenance of existing buildings covers two (2) areas:

- General maintenance on an annual basis to prevent the building from falling into a state of disrepair.
- Specific maintenance including any upgrading or renovation required to enable the building to resist hurricanes, earthquakes, fires and floods.

b. School Buildings as Shelters for Communities

School buildings, intended to serve as educational institutions, also have the potential of being used as shelters in disasters, so it is important that they are easy to access in both rural and urban settings.

In past disasters, e.g. Hurricane David in 1979, many people fled their homes to find safe refuge in local school buildings. Unfortunately, in many cases the buildings could not withstand the impact of the disaster and ended up without roofs.

It is possible, of course, to construct solid disaster resistant buildings, although this is not always economically viable. Also, the authorities must ensure that these structures are not only capable of withstanding all kinds of natural disasters, but also to provide post disaster shelters for the impacted population.

c. Providing Shelter

A shelter must meet various requirements so that it can effectively protect the public in various kinds of natural disasters. Depending on the kind and severity of a particular disaster, the building may have to provide shelter for a large number of people who could end up staying there for several days. In order to be an effective emergency shelter the school building should have the following features:

- It should be able to withstand hurricanes of more than 125 miles per hour.
- Stand at least six (6) feet above the flood level and be able to withstand the weight of all its occupants.
- Its foundations should resist the wave surge and its windows should be protected from the impact of direct wind.
- It should have sufficient water reserves and separate toilet facilities.
- It should have a minimum of two (2) showers, one for males and one for females.
- It should be equipped with a solid stairway if multi-leveled.

d. Policy Choices

Authorities responsible for implementing policies to protect schools from natural disasters must evaluate the following factors:

- How many schools are located in vulnerable areas.
- The nature of potential disasters in those areas.
- What potential consequences could a disaster have on the educational system.
- How to calculate costs and benefits of disaster resistant buildings.
- Once all these factors are properly looked into, the authorities can decide whether or not to build/equip school structures so they will be able to withstand natural disasters and provide safe port - emergency shelters for the local population.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Strategies for Implementation

Twenty (20) Government owned primary schools have been targeted. This is an initial list which will be influenced by ongoing maintenance activities by the Ministry of Education and the result of the assessment to be carried out to determine the nature of retrofitting activities to be done on each school building.

The targeted school buildings are distributed throughout the island. The geographical distribution indicates a higher level of concentration in the north/north-eastern and eastern part of the island representing the most vulnerable districts in Dominica. These areas are especially vulnerable to the ravages of hurricanes, especially high winds and sea swells. In most of these communities the school buildings are the only official place of refuge.

During the passage of hurricanes, persons from these communities often complain about inadequate safety at some of these school buildings/shelters. There have been occasions when during the passage of tropical weather systems the roofs of some of these buildings suffered partial structural damage during occupancy. This is extremely dangerous especially to women and children. This project seeks to reduce the vulnerability of these buildings to natural hazards including the ravages of hurricanes.

To achieve such a goal, the Government of Dominica appointed a project co-ordinating body with a project co-ordinator. The co-ordination of local events, including awareness and capacity building workshops, started in January 1998. The Organisation of American States commissioned a study of the twenty (20) schools identified by the national committee.

The objective of this study is to determine cost-effective retrofit options for each of the properties and to set standards for the retrofit work and guidelines for the related engineering services, which will be financed by the CBD.

The OAS consultant introduced a self-guided survey form on technical aspects of the construction of each property. He also inquired about the damages that were suffered by schools from hurricanes Luis and Marilyn and eventual repairs undertaken.

The outcome of that study will determine the final list of schools to be retrofitted, the nature of retrofitting work required, the respective role of each stake holder and the duration of the project. Based on the work to be carried out an estimated cost of the project will be determined. However, for a project of that nature to be successful, the collaborative effort being contemplated should, from inception, define very clearly the role of each stakeholder.

The participation of the Senior Architect of the Ministry of Communications, Works and Housing at the management level is already defining a clear role for that Ministry. The Senior Architect will serve as the counterpart to the consultants during the assessment phase of this project.

However, the involvement of the Senior Architect who incidentally does the annual assessment to determine suitability of school buildings as emergency shelters should extend well into the implementation stage of this project. He should continue to influence the maintenance activities of the Ministry of Education during the post retrofitting period.

It should also consider the need for community participation and education during the planning, implementation, and post-construction to ensure sustainability of the project. Traumatised individuals are not always able to exercise discretion during use of important facilities. The need for community capacity building has to be recognised. The building maintenance section of the Ministry of Education must also be so informed to allow for timely and appropriate maintenance within resource limitations.

Procurement of materials from venue community/or region rather that from the Capital will assist in

ensuring immediate benefits to local communities and build awareness and identity. Disaster preparedness committees, shelter managers and assistant managers, as well as the wider community have to be informed on the nature of retrofitting work to be undertaken and the sustainability of these works once completed. This is especially important for example to be able to cope with large numbers of adults in an emergency situation.

Where possible, community/local builders can be used during construction to help build identity and ownership. It may even be possible, based on the nature and scope of work to be done, to implement youth skills training modules thus enhancing the construction skills capacity of the local community and building greater awareness among young people.

9.2 Preliminary List of Schools to be Retrofitted

NAME OF PROPERTY	COMMUNITY
1. Government school	Atkinson
2. Government school	Bagatelle
3. Government school	Bense
4. Government school	Boetica
5. Government school	Colihaut
6. Government school	Coulibistrie
7. Government school	Giraudel
8. Government school (Secondary Section)	Goodwill
9. Government school	La Plaine
10. Government school	Marigot
11. Government school	Morne Jaune
12. Government school	Paix Bouche
13. Government school	Petite Soufriere
14. Government school	Pichelin
15. Government school	Salybia
16. Government school	San Sauveur
17. Government school	Tete Morne
18. Government school	Thibaud
19. Government school	Vieille Case

20. Government school	Woodford Hill

9.3 Map Highlighting the Location of the Preliminary List of 20 Schools to be Retrofitted

(Oversized, not included)

9.4 General School Upgrading Strategy

Name of School	Implementation Strategy
Woodford Hill Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica phase I retrofit project. • Listed in Government of Dominica Proposed rehab. programme phase II.
Petite Soufriere Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
San Sauveur Government School	• Small building section targeted for retrofit work OAS, CDB, ECHO, Government of Dominica phase I retrofit project. • Larger building listed in Government of Dominica propose rehab. programme phase II.
Mahaut River/Atkinson Government School	• Listed for retrofit work phase III.
Atkinson Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit plan phase I.
Vieille Case Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Thibaud Central Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica rehab programme phase II.
Bense/Anse-De-Mai/Anse Soldat Government School (upstairs)	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit programme phase I. • Listed in Government of Dominica proposed rehab. Programme phase II.

Paix Bouche Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Dos D'Ane Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for proposed retrofit work phase II.
St John's Primary School	
Portsmouth Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for proposed retrofit work phase III.
Savanne Paille Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for proposed retrofit work phase III.
Tete Morne Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
Pichelin Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Bagatelle Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Bellevue Chopin Government School	
Delices Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for retrofit work phase II.
La Plaine Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
Morne Jaune Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.

Boetica Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Dublanc Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for retrofit work phase II.
Colihaut Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Jimmit/Nehemiah Comprehensive School	• Listed for upgrading work by Basic Needs Trust Fund. • Listed for proposed retrofit work phase III.
Mahaut Government School	• Listed for proposed retrofit work phase III.
Salisbury Government School	• Listed in Government of Dominica proposed rehab. Programme phase II. • Listed for propose retrofit work phase III.
St Joseph Government School	• Listed in Government of Dominica proposed rehab. Programme phase II. • Listed for proposed retrofit work phase III.
Belles Government School	• Listed in Government of Dominica proposed rehab. Programme phase II. • Listed for proposed retrofit work phase II.
Coulibistrie Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
Massacre Government School	• Listed for proposed retrofit work phase III.
Warner Government School	• Listed in Government of Dominica rehab. programme phase II. • Listed for proposed retrofit work phase II.
Campbell Government School	• Listed for proposed retrofit work phase II.
Soufriere Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for proposed retrofit work phase II.
Scotts Head Government School	• Listed for retrofit work phase II.

Giraudel Government School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I. • Listed in Government of Dominica proposed rehab. programme phase II.
Eggleston Government School	• Listed for retrofit work phase III.
Morne Prosper Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for retrofit work phase II.
Wotten Waven Government School	• Listed for retrofit work phase II.
Newtown Government School	• Listed for retrofit work phase III.
Trafalgar Government School	• Listed for retrofit work phase III.
Laudat Government School	• Listed for retrofit work phase II.
Roseau/St. Mary's Primary	• Listed for retrofit work phase III.
Goodwill Government School	• Listed for retrofit work phase III.
Clifton Dupigny Community College	• Listed for retrofit work phase III.
Dominica Teachers College	• Listed for retrofit work phase III.
Cockrane Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for retrofit work phase II.
Marigot Junior School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for retrofit work phase III.
Marigot Primary School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
Marigot Pre-School	• Listed for proposed retrofit work phase III.
Marigot Foundation High School	• Listed for proposed retrofit work phase III.
Goodwill Primary School	• Targeted for retrofit work OAS, CDB, ECHO, Government of Dominica retrofit project phase I.
Penville Government School	• Listed in Government of Dominica proposed rehab. programme phase II. • Listed for proposed retrofit work phase II.

10.0 Annexes

10.1 Overview of Government Schools in Dominica

School	Type of Building	Water Facility	Toilet Facility	Playing Field	Remarks
Atkinson	Two Single storey rectangular building, reinforced concrete frame, with concrete blocks infill panels, aluminium louver Windows concrete floors, timber roof with corrugated galvanised sheeting.	There is a small storage tank which is damaged, no water.	Concrete trough but not functional pit latrines	There is a playing field	This is a new school completed in 1980 with British funds. a) Access - Good b) Electricity - Yes c) Staff 8; Principal 1 d) Cleaner 1; Roll 216
Bagatelle	Two-storey reinforced concrete building with folded plate concrete roof and floor slab- 10 classrooms, Principal's office, store and staff room and toilet block	Pipe borne water is available	Flush system using domestic fixtures with septic tank	A communal playing field is near by.	This is a new replacement building being constructed with USAID a) Access - Rough motorable b) Electricity - Available c) Staff - 6; Principal 1 d) Cleaner 1; Roll 146
Belles	Single storey R.C frame with concrete roof and floor slab with concrete blocks.	Portable water on tap to serve school only.	Pit latrine for staff and students.	None	An old building in need of replacement. a) Access - Good road b) Electricity - None c) Staff 3; Principal 1 d) Cleaner 1; Roll 75

Bellevue Chopin	Single storey R.C building with folded plate, concreted roof and concrete floor. Slab- 3 classrooms, Principal's office, store room, staff room and toilet block.	Pipe borne is available	Automatic flush system with septic tank.	There is a community playing field on the compound.	This building was very badly damaged by hurricanes but replaced by BNTF a) Access - Along main road b) Electricity - c) Staff 3; Principal 1 d) Cleaner none; Roll 88
Bense	Two-storey rectangular building, reinforced concrete frame, with concrete blocks infill panels, aluminium louvres windows, timber roof trusses with corrugated galvanised sheeting.	School served with portable water.	Pit latrine for staff and students.	No suitable playing field.	Very slightly damaged by last hurricane. a) Access - Good road b) Electricity - Yes c) Staff 4; Principal 1 d) Cleaner 1; Roll 95
Boetica	Two Single storey rectangular buildings; reinforced concrete columns and beam with concrete blocks infill panels, aluminium louver windows, concrete floors, timber roof with corrugated galvanised sheets.	Water from village supply but this is not reliable.	Pit latrines	None	New building erected after hurricane with funds provided by ACCT a French Agency. a) Access - Along main road b) Electricity - Yes c) Staff 3; Principal 1 d) Cleaner 1; Roll 78
Calibishie	Consists of four blocks: one two-storey and the others single storey. All are load bearing block walls constricted with concrete roof and floor with	Village supply functional but school has water tank located on roof of toilet block.	Lavatory with WC's face basins and urinals which discharge into septic tank	There is a playing field for the use of the school.	Very little damage done. a) Access - Good b) Electricity - Yes c) Staff 9; Principal 1

	louvered windows.				
Campbell	Single storey L shaped building of concrete structure with concrete block panel infill, concrete roof and floor, louvered windows in aluminium panel.	Portable water on tap.	WC's with face basin and urinals which discharge into septic tank.	None	This is a replacement building constructed with funds provided by USAID. a) Access - Difficult b) Electricity - Yes c) Staff 4; Principal 1 d) Cleaner 1; Roll 90
Castle Bruce	Four Single storey rectangular buildings structural steel frames. Three of which have metal wall cladding and the other concrete block infill.	There is pipe borne water to the school.	Lavatory complete with fixtures.	There is a playing field nearby but this requires improvement.	Buildings have been extensively repaired with funds provided by CIDA-December 1982. a) Access - Good b) Electricity - Yes c) Staff 13; Principal 1 d) Cleaner 1; Roll 370
Clifton	Two Single storey rectangular buildings reinforced concrete frame with concrete block infill wire mesh window, concrete floors and timber trusses with corrugated galvanised roof sheeting.	Pipe borne water but there is a concrete cistern which collects run off water from roof.	Trough system	None	Suffered slight damaged form hurricane. a) Access - Motorable road b) Electricity - Yes c) Staff 7; Principal 1 d) Cleaner 1; Roll 168
Cockrane	Single storey concrete building with concrete roof and partly suspended concrete floor slab with concrete block panel infill,	Water provided from village supply.	Lavatory with WC's, face basins and urinals which discharge into septic tank.	There is no playing field attached to the school.	New school constructed after hurricane with funds provided by Trinidad & Tobago medic. a) Access - Good b) Electricity - Yes

	louvered window in aluminium frames.				c) Staff 3; Principal 1 d) Cleaner 1; Roll 145
Colihaut	Two storey rectangular building, reinforced concrete frames, concrete block infill panels, aluminium louver windows, concrete floors, roof trusses and corrugated galvanised roof sheeting.	Portable water on tap.	In separate building with concrete trough with overhead septic tank.	Small recreation area available.	Slight damage form hurricane a) Access - Very good b) Electricity - Yes c) Staff 6; Principal 1 d) Cleaner 1; Roll 145
Concord	Single storey L shaped timber superstructure on concrete piers, timber floor, corrugated galvanised roof sheeting	Pipe borne water	Pit latrine	There is a playing field.	Slight damage from hurricane. a) Access - Along main road. b) Electricity - Yes c) Staff 6; Principal 1 d) Cleaner 1; Roll 51
Coulibistrie	Single storey L shaped coseley building with masonry columns and gable end walls; concrete block panel infill, timber pitched roof with continuous ridge vent, concrete floor slab on grade.	There is pipe borne water to the school.	Concrete through type with overhead automatic septic tank.	There is a small quadrangle.	Repairs have been carried out but further repairs in progress. a) Access - Along main road b) Electricity - Yes c) Staff 5; Principal 1 d) Cleaner 1; Roll 110
Delices	Three Single storey R.C frame building, concrete roof and floor slab, blocks infill, louvered windows.	Private water supply gravity flow with storage tank	Automatic flush system	There is land available	New building completed in 1984 a) Access - Difficult b) Electricity - c) Staff 9; Principal 1

					d) Roll 194
Dos Dane	Reinforced concrete rectangular one storey building with concrete roof and floor slab, concrete blocks infill panel with decorative block windows on one side and aluminium windows on the other.	There is water	Concrete trough type with overhead septic tank emptying into septic tank.	Land available	This is new structure under CDB/USAID programme a) Access - Rough motorable b) Electricity - Not yet c) Staff 3; Principal 1 d) Cleaner 1; Roll 49
Dublanc	Single storey R.C frame with a concrete roof and floors, louvered windows on one side and vent blocks on the other.	There is pipe borne water on premises	Automatic flushing system	There is a communal playing field close by	A BNTF replacement a) Access - Along main road b) Electricity - Yes c) Staff 6; Roll 144 d) Cleaner 1
Giraudel	Single storey rectangular building reinforced concrete frame with concrete blocks infill panels, concrete floors timber trusses, and corrugated galvanised roof sheeting.	There is pipe borne water to the school.	Pit latrine	None- no suitable lands adjacent to the school	Some repairs carried out recently. a) Access - Good b) Electricity - Yes c) Staff 6; Principal 1 d) Cleaner 2; Roll 101
Goodwill	The school has three blocks. Each block is two storey rectangular building, RSV frame with concrete blocks infill panel to window sill and timber louvered	There is pipe borne water to the school.	Lavatory WC's complete with sewerage system.	There is a playing field.	Extensive repairs just completed with funds provided by CIDA. a) Access - Good b) Electricity - Yes c) Staff 27; Principal 1 d) Cleaner 1; Roll 830

	Windows on one side with vent clay blocks to full height on other side. Aluminium sun visors on both sides. Rubble masonry on other two sides.				
Grand Bay	School consists of four separate blocks. Block A Two storey structural steel building with corrugated prepainted steel roof sheeting vent blocks panel infill to the West side with timber blades in aluminium frame windows to the East. Concrete block infill below window levels. Block B Same as Block A but three storey building. Block C Home economics single storey structural steel with concrete block panel infill to window height. Windows wooden blades in aluminium frames. Block D Woodwork shop. Single storey structural steel with concrete block infill, wooden blades in aluminium frame windows. All end	There is portable water on tap.	Lavatories with WC's, face basins and urinals in blocks A and B.	There is a playing field.	Extensive repairs with funds provided by CIDA. Further renovations in progress a) Access - Motorable b) Electricity - Yes c) Staff 22; Principal 1 d) Cleaner 3; Roll 569 e) Watchman

	walls of rubble wall and floors reinforced concrete.				
Grand fond	Reinforced concrete beam and column structural frame with concrete and landcrete blocks infill in parts. Timber roof trusses and rafters with corrugated galvanised roof concrete slab.	Water in village	Pit latrine	There is a playing field.	Build extensively repaired/ renovated recently. a) Access - Motorable road b) Electricity - Yes c) Staff 7; Principal 1 d) Cleaner 1; Roll 174
Laplaine	This school consists of four blocks. <u>Block A</u> Single storey, structural steel frame with pitched roof. Aluminium ribbed wall cladding and inner liner, aluminium ribbed roof sheeting with asbestos insulation ceiling. Internal partitions of aluminium sheeting. <u>Block B</u> Single storey structural steel frame with pitched roof. Roof and wall cladding as at A. <u>Block C</u> Similar to B with part concrete block infill. <u>Block D</u> Rectangular	There is pipe borne water in the school.	Lavatory with WC's and urinals with septic tank.	There is a small playing area. Village playing field not far away.	Extensive repairs carried out recently with funds provided by CIDA and Government. Further repairs needed. a) Access - Along motorable road.] b) Electricity - Yes c) Staff 11; Principal 1 d) Cleaner 1; Roll 297

	building of load bearing block walls with steel rafters and purlins and corrugated galvanise roof sheeting.				
Laudat	Single storey rectangular RC structure with folder plate roof and concrete floor blocks infill. Louver window on one side and vent blocks on the other.	There is pipe borne water on tap.	Automatic flushing system	None	This is a new structure erected with BNTF funds. a) Access - Rough motorable b) Electricity - Available c) Staff 3; Principal 1; d) Roll - 61
Mahaut	Two storey reinforced concrete structure with concrete block infill panels and concrete roof and floor slab. Decorative concrete blocks infill bent windows on East and timber louvres in.	There is water on tap.	Concrete trough type with overhead septic tank.	There is a large area for recreation.	Extensive repairs completed recently with USAID funds. a) Access - Motorable road b) Electricity - Available on site c) Staff 15; Principal 1 d) Cleaner 1; Roll 357
Marigot Junior	Three Single storey rectangular structure of reinforced concrete and concrete blocks cladding with concrete floor and roof.	There is pipe borne water.	Automatic flushing system.	The school has no playing field but there is a suitable area in the nearby church yard.	The original building which suffered damage from the last hurricane is church property. New school built under BNTF. a) Access - On main road b) Electricity - Available c) Staff 5; Principal 1 d) Cleaner 1; Roll 169

Marigot Weirs	Two storey structural steel framed structure rectangular in shape, pitched roof with prepainted R panel roof sheeting, concrete floors with concrete block infill panels.	There is pipe borne water with storage.	Concrete trough type with overhead septic tank.	There is a playing field.	Extensive repairs carried out after hurricane with USAID funds. a) Access - Motorable b) Electricity - Yes c) Staff 18; Principal 1 d) Cleaner 1; Roll 434
Massacre	Two storey rectangular reinforced concrete structure with concrete roof and floor and concrete block infill panels and internal walls, west windows of timber louvered blades in aluminium frames and decorative block vent windows on East	There is pipe borne water on tap.	Lavatory with WC's and urinals which discharge into septic tank.	There is a large area for playing.	New structure built with USAID funds. a) Access - On main road b) Electricity - On site c) Staff 14; Principal 1 d) Cleaner 2; Roll 450
Morne Jaune	Single storey, rectangular structure, reinforced concrete frames, concrete block infill panels, timber roof trusses with corrugated galvanised sheeting and ceiling, with concrete floor. Aluminium louvered windows. Other RC frame, concrete roof and floor with louvered windows	There is pipe borne water to school.	Separate block with automatic flush system.	None	This building was slightly damaged by hurricane. New addition funded under BNTF. a) Access - Motorable b) Electricity - Yes c) Staff 7; Principal 1 d) Cleaner 1; Roll 154

	on one side and vent block on the other.				
Morne Prosper	L shaped R.C. framed with folded plate roof and floor. Louvered windows in adjustable frames with vent blocks on one side.	There is pipe borne water on premises.	Automatic flushing system.	There is a playing field.	Original building damaged by hurricane, but replaced with funds from BNTF. a) Access - Motorable b) Electricity - Restored c) Staff 4; Principal 1 d) Cleaner 1 Roll 100
Newtown Infants	Part brick part timber with trussel roof covered with shingles on laths, concrete floor raised in tiles.	There is water on tap.	Domestic toilets.	There is a communal playing field some distance from the school.	New building funded by French Agency. a) Access - Situated on Victoria Street b) Electricity - Available c) Staff 10; Principal 1 d) Cleaner 1; Roll 316
Paix Bouche	Two storey rectangular structure reinforced concrete frame, concrete block infill panels, with aluminium louvered windows, concrete floor, timber roof trusses, corrugated galvanised roof sheeting, ceiling.	Pipe borne water to school	Pit latrine	No playing field	Minor damage from hurricane now repaired. a) Access - Rough motorable b) Electricity - Available c) Staff 8; Principal 1 d) Cleaner 1; Roll 201
Penville	New 2 storey structure of reinforced concrete with	There is pipe borne water in village.	Lavatory W.C. with septic tank system.	There is a playing field.	A new school has been built to replace the one destroyed by hurricane.

	concrete roof and floor concrete block infill panels and internal walls, West windows of vent blocks and East of timber louvered blades in aluminium frames.				a) Access - Rough motorable b) Electricity - Yes c) Staff 7; Principal 1 d) Cleaner 1; Roll 159
Petite Savanne	Two storey R.C structure with folded plate roof concrete floor slab with concrete blocks infill, louvered windows along walkway, vent blocks at the back.	Pipe borne water.	Automatic flushing system with septic tank.	No playing field.	New building constructed with funds from BNTF. a) Access - Rough motorable b) Electricity - Restored c) Staff 6; Principal 1 d) Cleaner 1; Roll 165
Petite Soufriere	Reinforced concrete rectangular one storey building with concrete roof and floor slab, concrete blocks infill panel with decorative block windows on one side and aluminium windows on the other.	There is water	Concrete trough type with overhead septic tank emptying into septic tank.	Land available.	There is new structure under CDB/USAID programme. a) Access - Rough motorable b) Electricity - Yes c) Staff; Principal 1 d) Roll 49
Pichelin	Two Single storey rectangular structures linked by covered walkway. Reinforced concrete frame concrete frame, concrete block infill, concrete floors, timber roof trusses, corrugated galvanised roof	There is water	Concrete trough type septic tank.	There is land for a playing field.	This is a relatively new build which received very slight hurricane damage. a) Access - Along main road. b) Electricity - Available c) Staff 4; Principal 1 d) Cleaner 1; Roll 135

	sheeting and aluminium windows.				
Portsmouth	An L shaped structure with one part single and the other double storey of reinforced concrete frame, concrete block infill concrete floors, part concrete and part timber roof with corrugated galvanise sheeting, with timber louver in aluminium frame windows in part and wire mesh in places.	There is pipe borne water.	Concrete trough with overhead septic tank with septic tank system.	There is a large communal playing field adjoining the school.	An addition was put on with funds from USAID. a) Access - Good b) Electricity - Available c) Staff 13; Principal 1 d) Cleaner 1; Roll 329
Roseau Girls	A rectangular Single storey with open veranda on East side, construction floors, load bearing brick walls with ring beam, timber trusses and rafters and corrugated galvanised roof sheeting, batten windows and doors.	Pipe borne water to school.	Lavatory complete with WC's and face basins.	Adjacent to the windsor park.	Much repair work done since hurricane. a) Situated on street b) Electricity - Available c) Staff 7; Principal 1 d) Cleaner 1; Roll 141
Roseau Infants	U shaped building West section 2 storey all of R.C. frame with folded plate roof, concrete floor, louver windows inadjustable framework, block on walkway and concrete blocks	Pipe borne water to school.	Lavatory for teachers and students.	There is a small paved area.	New building erected with funds from BNTF. a) Access - Off main road but motorable. b) Electricity - Available c) Staff 10; Principal 1 d) Cleaner>

	infill.				**Transfer interrupted!** d>
St. Joseph Infants	Two storey and a Single storey block constructed of load bearing blockwork, concrete floors, and roof, wooden louver windows.	Pipe borne water to school.	Lavatory complete with fixtures septic tank system.	A large quadrangle is provided.	Repaired recently with funds form CIDA. a) Access - Just off main road. b) Electricity - Yes c) Staff 10; Principal 1 d) Cleaner 2; Roll 324; Watchman 1
St .Joseph Senior	Two storey building in four rectangular blocks connected by uncovered walkway of load bearing blockwalls, concrete beams and floor, concrete roof and wooden louver windows.	There is a large storage tank from which water is pumped to smaller distribution tanks. Also now connected to mains.	Lavatory complete with fixtures. Septic tank system.	No playing field but land is available.	Repaired recently with funds from CIDA. a) Access - Second class motorable b) Electricity - Available c) Staff 16; Principal 1 d) Watchmen 3; Roll 384
Salisbury	Two storey building in two rectangular blocks connected by covered walkway, constructed of structural steel portal frame, pitched roof with aluminium sheeting and ceiling tiles, concrete block infill panels with aluminium louver windows and concrete floors.	There is water on tap	Lavatory complete with fixtures with septic tank system.	There is no established playing field.	Some repairs were done after hurricane. a) Access - Rough motorable b) Electricity - Available c) Staff 11; Principal 1 d) Cleaner 3; Roll 298
Salybia	R.C. frame structure with	Tank to collect	Pit latrine	There is a playing area.	Repairs recently carried out.

	concrete block infill panels, timber roof trusses and purlins, corrugated galvanised sheeting.	water from roof. There is pipe borne water.			a) Access - Very difficult for motor vehicles. b) Electricity - Yes c) Staff 8; Principal 1 d) Cleaner 1; Roll 194
San Sauveur	R.C. frame structure with concrete block infill panels, timber roof trusses and rafters with corrugated prepainted steel roof sheeting.	There is water on tap.	Concrete trough with overhead septic system leading to septic tank.	There is a small recreation area.	Repairs recently carried out CIDA funds. a) Access - Motorable b) Electricity - Yes c) Staff 12; Principal 1 d) Cleaner 3; Roll 331
Savanne Paille	R.C. frame structure with concrete folded plate roof and concrete floor with concrete block infill panels, timber louvered windows on East and vent blocks on West.	Tank to collect water from roof. Also portable water in area.	Pit latrine	There is a playing area.	New structure built with USAID funds. a) Access - Just off main road, motorable. b) Electricity - Restored c) Staff 2; Principal 1 d) Cleaner 1; Roll 27
Sinekou	Two Single storey R.C. frame with concrete roof and floor, louvered windows with vent blocks on walkway side.	There is water on tap.	Automatic flushing system with septic.	There is no playing field.	a) Access - Little off main road - not motorable b) Electricity - Yes c) Staff 5; Principal 1 d) Roll 159
Soufriere	Single storey L shaped building, reinforced concrete frames, concrete block walls timber floors, timber roof	A tank collects water from roof.	Pit latrine	Large playing field adjacent to school.	Repairs carried out after hurricane. a) Access - Motorable road b) Electricity - Restored to village c) Staff 7; Principal

	trusses with galvanised roof sheeting. There is an open veranda on one side.				1 d) Cleaner 1; Roll 194
Tete Morne	Single storey L shaped building, rubble masonry, columns, concrete floors, concrete block wall infill timber trusses with corrugated galvanised sheeting and batten shutters.	There is pipe borne water.	Pit latrine	None	Repaired after hurricane. a) Access - Motorable road b) Electricity - Restored in the area c) Staff 9; Principal 1 d) Cleaner 1; Roll 212
Thibaud	A two storey rectangular structure, reinforced concrete frames, concrete block infill panels, timber roof trusses with close board ceiling, and asphalt roof sheeting.	There is water on tap.	Concrete trough type with overhead flush tank.	There is a playing field.	Repaired after hurricane. a) Access - Along main road b) Electricity - Available c) Staff 5; Principal 1 d) Cleaner 1; Roll 96
Trafalgar	Single storey R.C. frame with concrete folded plate roof and concrete floor, vent blocks on walkway and louver window on adjustable frame on West side.	There is pipe borne water.	Automatic flushing system.	There is no playing field.	a) Access - Motorable village road b) Electricity - Available c) Staff 4; Principal 1 d) Roll 84
Vieille Case	Single storey structure in four rectangular blocks of structural steel, corrugated metal siding and roofing, concrete floors and louver windows.	There is water on tap.	Lavatory complete with fixtures.	There is a large playing field.	Recently repaired a) Access - Along motorable road b) Electricity - Not yet on site c) Staff 8 ; Principal 1 d) Cleaner 1; Roll 193

Warner	Single storey reinforced concrete structure with concrete floor and roof. Concrete block infill panel, aluminium louver windows.	There is pipe borne water.	Pit latrine	No playing field	Repairs carried out after hurricane. a) Access - Motorable b) Electricity - Yes c) Staff 3; Principal 1 d) Roll 57
Watten Waven	Single storey R.C. frame building with concrete roof and floor, concrete blocks infill panels, louvered windows on West and vent blocks on walkway.	Water on tap	Pit latrine	There is a playing area.	School is temporary headquarters. a) Access - Difficult b) Electricity - Not available c) Staff 2; Principal 1 d) Cleaner 1; Roll 38
Wesley	Two storey reinforced concrete structure with concrete floors and roof concrete blocks infill panel, open walkway, decorative vent blocks on West and timber louver window in aluminium frame.	There is water on premises.	Concrete trough type with overhead tank.	There is provision for playing field.	a) Access - Along motorable road b) Electricity Available c) Staff 14; Principal 1 d) Cleaner 1; Roll 400
Woodford Hill	Single storey L shaped reinforced concrete structure, concrete blocks infill panel, concrete floor, timber trussed roof with corrugated galvanised sheeting aluminium louvered windows.	Storage tank collects water form roof to supplement pipe borne supply.	Lavatory complete with fixtures	There is a small playing area.	New building constructed with BDD funds. a) Access - Along motorable road. b) Electricity - Available c) Staff 8; Principal 1 d) Cleaner 1; Roll 243

10.2 Seismic and Hurricane Vulnerability Assessment Forms

Seismic Vulnerability Assessment

FIELD SURVEY GUIDE - PART 1

Name of Facility:

ID Number:

Member Information:

Member	Plan dimensions	Concrete block strength	Concrete strength	Reinforcement grade & %	Structural steel grade	Timber grade	Commen
Main foundations							
Columns							
Walls							
Beams							
Slabs							
Rafters							
Purlins							
Roofing							

Photographs:

- North elevation
- East elevation
- South elevation
- West elevation

Structural Systems (longitudinal)

- Load-bearing walls
- Braced frames
- Column and beam
- Mixed systems (describe)
- Soft storeys
- Short columns

Structural Systems (transverse)

- Load-bearing walls
- Braced frames
- Column and beam
- Mixed systems (describe)
- Soft storeys
- Short columns

School	ID number	Direction	Number of storeys	Total floor area	Column area at base (above grade)	RC wall area at base (steel columns)	Masonry wall length at base
		T L					
		T L					
		T L					
		T L					
		T L					

Seismic Vulnerability Assessment

Field Survey Guide—Part 2

School

ID Number

Column dimensions													
		1T	1L	2T	2L	3T	3L	4T	4L	5T	5L	6T	6L
A	3rd storey												
	2nd storey												
	1st storey												
B	3rd storey												
	2nd storey												
	1st storey												
C	3rd storey												
	2nd storey												
	1st storey												
D	3rd storey												
	2nd storey												
	1st storey												

Wall dimensions - Longitudinal													
		1-2	1-2	2-3	2-3	3-4	3-4	4-5	4-5	5-6	5-6	6-7	6-7
		length	thickness	length	thickness	length	thickness	length	thickness	length	thickness	length	thick
A	3rd storey												
	2nd storey												
	1st storey												
B	3rd storey												

	2nd storey												
	1st storey												
C	3rd storey												
	2nd storey												
	1st storey												
D	3rd storey												
	2nd storey												
	1st storey												

Wall dimensions - Transverse

		1	1	2	2	3	3	4	4	5	5	6	6
		length	thickness	length	thickness	length	thickness	length	thickness	length	thickness	length	thick
A-B	3rd storey												
	2nd storey												
	1st storey												
B-C	3rd storey												
	2nd storey												
	1st storey												
C-D	3rd storey												
	2nd storey												
	1st storey												
D-E	3rd storey												
	2nd storey												
	1st storey												

Sketch

Line sketches should be provided at each floor level indicating:

- Columns
- Reinforced concrete (RC) walls and
- masonry walls.

Steel columns should be noted on the sketches and their overall dimensions stated in the table. In general, the walls should be shown only when they are continuous from floor to floor.

Hurricane Vulnerability Assessment

FIELD SURVEY GUIDE

Building Data

1. Name of Facility
2. Address
3. ID Number
4. Surveyor's Name
5. Survey Date
6. Year Constructed
7. Years of Major Additions or Changes
8. Was building formally engineered?
    - Yes
    - No
    - Do not know
9. Number of Storeys
10. Windstorm Loss History (Add separate sheet for additional details if necessary)
11. Surveyor's Comments (Add separate sheet for additional details if necessary)

Environment

1. Is there potential of debris from metal or wooden buildings, trees, loose material or roofing within 300 ft radius?
    - Yes
    - No
2. What is the type of surrounding terrain?
    - Coastal
    - Open field
    - Town
3. What is the type of topography?
    - Flat or gently undulating
    - Hillside or ridge
    - Promontory or cliff

Roof Envelope

1. Indicate the geometry of the roof:

   - Flat
   - Gable
   - Hip
   - Other (describe)

2. What is the primary roof support system (supported at the exterior walls)?

   - Reinforced concrete
   - Steel beam
   - Steel truss
   - Open-web steel joist
   - Tapered steel beam
   - Wood truss
   - Wood beam or rafter
   - Other (describe)

3. Is there a positive anchorage system (such as hurricane straps) connecting the roof system at the exterior walls?

   - Yes
   - No
   - Do not know

4. What materials are used for the roof deck?

   - Cast-in-place concrete slab
   - Precast concrete
   - Metal deck
   - Wood battens
   - Plywood
   - Wood close boarding
   - Other (describe)

5. What type of roof covering is used?

   - Built-up roof with gravel
   - Standing seam metal roof
   - Metal profiled sheets
   - Asbestos cement sheets
   - Single-ply membrane
   - Tile roof
   - Timber shingles
   - Asphalt shingles
   - Other (describe)

6. What is the age of the roof covering?

   - Less than 5 years
   - 5 to 10 years

- 11 to 15 years
- 16 to 20 years
- greater than 20 years
- Do not know

7. Are there skylights or ventilators on the roof?

- Yes
- No

Wall Envelope

1. What is the primary vertical load resisting system at the exterior walls?

- Reinforced concrete
- Steel
- Reinforced masonry
- Unreinforced masonry
- Wood
- Other (describe)

2. What is the percentage of wall area covered by glass or mesh or open blocks?

- 0% to 5%
- 6% to 20%
- 21% to 60%
- Greater than 60%

4. Are the glass or mesh or open blocks provided with permanently installed shutters?

- Yes
- No

4. Indicate the type of cladding (other than in 2 and 3 above) used

- Reinforced concrete block masonry
- Unreinforced concrete block masonry
- Precast concrete elements
- Stone panels
- Metal panels
- Wood
- Other (describe)

6. Indicate the type of external doors in the building

- Metal panels
- Solid wood (incl T&G)
- Hollow-core plywood
- Solid-core plywood
- Other (describe)

Other Considerations

1. Are there awnings, canopies, covered walkways or carports?
    - Yes
    - No

2. What wind code was used for the design of the building?
    - BNS CP28 - Code of Practice for Wind Loads for Structural Design
    - CUBiC Part 2 Section 2 - Structural Design Requirements, Wind Loads
    - BS 6399 Part 2 - Code of Practice for Wind Loads. Year?
    - ASCE 7 - Minimum Design Loads for Buildings and Other Structures. Year?
    - South Florida Building Code. Year?

3. What damage was suffered by the buildings due to Hurricanes Luis and Marilyn in 1995? (Add separate sheet for additional details if necessary)

4. What types of repairs or types of reconstruction have taken place? (Add separate sheet for additional details if necessary)

5. What standards (with reference to wind and earthquakes) were used in the repairs or reconstruction? (Add separate sheet for additional details if necessary)

6. Surveyor's comments (Add separate sheet for additional details if necessary)